

## **Quantifying Urban-induced Flow Regime Alteration and Evaluating Mitigation Alternatives Using Mathematical Models and Hydrologic Metrics**

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**Abstract.** There is growing interest in identifying mechanistic linkages between watershed urbanization and associated geomorphic and ecological consequences in urban streams. Recognizing watershed hydrology as a key determinant in the structuring of ecological systems, an increasing number of researchers are attempting to characterize the ecologically important aspects of long-term stream flow patterns using statistically-based hydrologic metrics. Complimentary to such research efforts is the determination of the efficacy of stormwater controls for mitigating undesirable effects in streams caused by urbanization. This study integrates a modeling approach, commonly used for designing runoff controls, with a flow regime approach aimed at quantifying ecologically important aspects of flow regime. Hydrologic metrics from previous studies were tailored to better suit the small-scale, urban context. MATLAB© was used to calculate the select set of metrics from 48-year, 15-minute continuous flow time series, generated by EPA SWMM4.4h. Potential climatic influences on metric behavior were examined by comparing metric behavior obtained by using rainfall from Fort Collins, CO and Atlanta, GA. The influence of temporal resolution of flow data on metric values and its implications for the metric selection process were also investigated.

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